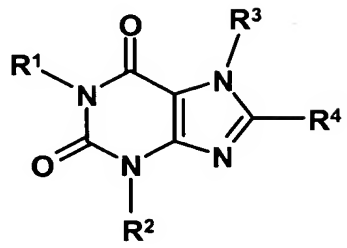
What is Claim d is:

1. A compound of general formula



(I),

wherein

R^1 represents an A-B-D group wherein

A denotes a C_{1-6}-alkyl group substituted by a phenyl group, where the C_{1-6}-alkyl group may be substituted by one to twelve fluorine atoms and the phenyl ring may be substituted by the groups R^{10} to R^{14} and

R^{10} denotes a fluorine, chlorine, bromine or iodine atom,

a C_{1-4}-alkyl, hydroxy, or C_{1-4}-alkyloxy group,

a nitro, amino, C_{1-3}-alkylamino, di-(C_{1-3}-alkyl)amino, cyano-C_{1-3}-alkylamino, [N-(cyano-C_{1-3}-alkyl)-N-C_{1-3}-alkyl-amino], C_{1-3}-alkyloxy-carbonyl-C_{1-3}-alkylamino, pyrrolidin-1-yl, piperidin-1-yl, morpholin-4-yl, piperazin-1-yl, 4-(C_{1-3}-alkyl)-piperazin-1-yl, C_{1-3}-alkyl-carbonylamino, arylcarbonylamino, aryl-C_{1-3}-alkyl-carbonylamino, C_{1-3}-alkyloxy-carbonylamino, aminocarbonylamino, C_{1-3}-alkyl-aminocarbonylamino, di-(C_{1-3}-alkyl)aminocarbonylamino, C_{1-3}-alkyl-sulphonyl-amino, bis-(C_{1-3}-alkylsulphonyl)-amino, aminosulphonylamino, C_{1-3}-alkylamino-sulphonylamino, di-(C_{1-3}-alkyl)amino-sulphonylamino, morpholin-4-yl-

sulphonylamino, (C_{1-3}-alkylamino)thiocarbonylamino, (C_{1-3}-alkyloxy-carbonylamino)carbonylamino, arylsulphonylamino or aryl-C_{1-3}-alkyl-sulphonylamino group,

an N-(C_{1-3}-alkyl)-C_{1-3}-alkyl-carbonylamino, N-(C_{1-3}-alkyl)-arylcarbonylamino, N-(C_{1-3}-alkyl)-aryl-C_{1-3}-alkyl-carbonylamino, N-(C_{1-3}-alkyl)-C_{1-3}-alkyloxy-carbonyl-amino, N-(aminocarbonyl)-C_{1-3}-alkylamino, N-(C_{1-3}-alkyl-aminocarbonyl)-C_{1-3}-alkylamino, N-[di-(C_{1-3}-alkyl)aminocarbonyl]-C_{1-3}-alkylamino, N-(C_{1-3}-alkyl)-C_{1-3}-alkyl-sulphonylamino, N-(C_{1-3}-alkyl)-arylsulphonylamino, or N-(C_{1-3}-alkyl)-aryl-C_{1-3}-alkyl-sulphonylamino group,

a 2-oxo-imidazolidin-1-yl, 2,4-dioxo-imidazolidin-1-yl or 2,5-dioxo-imidazolidin-1-yl group wherein the nitrogen atom in the 3 position may in each case be substituted by a methyl or ethyl group,

a cyano, carboxy, C_{1-4}-alkyloxy-carbonyl, aminocarbonyl, C_{1-3}-alkyl-amino-carbonyl, di-(C_{1-3}-alkyl)-aminocarbonyl, pyrrolidin-1-yl-carbonyl, piperidin-1-yl-carbonyl, morpholin-4-yl-carbonyl, piperazin-1-yl-carbonyl or 4-(C_{1-3}-alkyl)-piperazin-1-yl-carbonyl group,

a C_{1-3}-alkyl-carbonyl or an arylcarbonyl group,

a carboxy-C_{1-3}-alkyl, C_{1-3}-alkyloxy-carbonyl-C_{1-3}-alkyl, cyano-C_{1-3}-alkyl, aminocarbonyl-C_{1-3}-alkyl, C_{1-3}-alkyl-aminocarbonyl-C_{1-3}-alkyl, di-(C_{1-3}-alkyl)-aminocarbonyl-C_{1-3}-alkyl, pyrrolidin-1-yl-carbonyl-C_{1-3}-alkyl, piperidin-1-yl-carbonyl-C_{1-3}-alkyl, morpholin-4-yl-carbonyl-C_{1-3}-alkyl, piperazin-1-yl-carbonyl-C_{1-3}-alkyl or 4-(C_{1-3}-alkyl)-piperazin-1-yl-carbonyl-C_{1-3}-alkyl group,

a carboxy-C_{1-3}-alkyloxy, C_{1-3}-alkyloxy-carbonyl-C_{1-3}-alkyloxy, cyano-C_{1-3}-alkyloxy, aminocarbonyl-C_{1-3}-alkyloxy, C_{1-3}-alkyl-aminocarbonyl-C_{1-3}-alkyloxy, di-(C_{1-3}-alkyl)-aminocarbonyl-C_{1-3}-alkyloxy, pyrrolidin-1-yl-carbonyl-C_{1-3}-alkyl-

oxy, piperidin-1-yl-carbonyl-C_{1-3}-alkyloxy, morpholin-4-yl-carbonyl-C_{1-3}-alkyl-oxy, piperazin-1-yl-carbonyl-C_{1-3}-alkyloxy or 4-(C_{1-3}-alkyl)-piperazin-1-yl-carbonyl-C_{1-3}-alkyloxy group,

a hydroxy-C_{1-3}-alkyl, C_{1-3}-alkyloxy-C_{1-3}-alkyl, amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl, di-(C_{1-3}-alkyl)-amino-C_{1-3}-alkyl, pyrrolidin-1-yl-C_{1-3}-alkyl, piperidin-1-yl-C_{1-3}-alkyl, morpholin-4-yl-C_{1-3}-alkyl, piperazin-1-yl-C_{1-3}-alkyl, 4-(C_{1-3}-alkyl)-piperazin-1-yl-C_{1-3}-alkyl group,

a hydroxy-C_{1-3}-alkyloxy, C_{1-3}-alkyloxy-C_{1-3}-alkyloxy, C_{1-3}-alkylsulphanyl-C_{1-3}-alkyloxy, C_{1-3}-alkylsulphinyl-C_{1-3}-alkyloxy, C_{1-3}-alkylsulphonyl-C_{1-3}-alkyloxy, amino-C_{1-3}-alkyloxy, C_{1-3}-alkylamino-C_{1-3}-alkyloxy, di-(C_{1-3}-alkyl)-amino-C_{1-3}-alkyloxy, pyrrolidin-1-yl-C_{1-3}-alkyloxy, piperidin-1-yl-C_{1-3}-alkyloxy, morpholin-4-yl-C_{1-3}-alkyloxy, piperazin-1-yl-C_{1-3}-alkyloxy, 4-(C_{1-3}-alkyl)-piperazin-1-yl-C_{1-3}-alkyloxy group,

a mercapto, C_{1-3}-alkylsulphanyl, C_{1-3}-alkysulphinyl, arylsulphinyl, C_{1-3}-alkyl-sulphonyl, arylsulphonyl, C_{1-3}-alkylsulphonyloxy, arylsulphonyloxy, trifluoromethylsulphanyl, trifluoromethylsulphinyl or trifluoromethylsulphonyl group,

a sulpho, aminosulphonyl, C_{1-3}-alkyl-aminosulphonyl, di-(C_{1-3}-alkyl)-amino-sulphonyl, pyrrolidin-1-yl-sulphonyl, piperidin-1-yl-sulphonyl, morpholin-4-yl-sulphonyl, piperazin-1-yl-sulphonyl or 4-(C_{1-3}-alkyl)-piperazin-1-yl-sulphonyl group,

a methyl or methoxy group substituted by 1 to 3 fluorine atoms,

an ethyl or ethoxy group substituted by 1 to 5 fluorine atoms,

a C_{2-4}-alkenyl or C_{2-4}-alkynyl group,

a C_{3-4}-alkenyloxy or C_{3-4}-alkynyloxy group,

a C_{3-6}-cycloalkyl or C_{3-6}-cycloalkyloxy group,

a C_{3-6}-cycloalkyl-C_{1-3}-alkyl or C_{3-6}-cycloalkyl-C_{1-3}-alkyloxy group or

an aryl, aryloxy, aryl-C_{1-3}-alkyl or aryl-C_{1-3}-alkyloxy group,

R^{11} and R^{12}, which may be identical or different, in each case denote a fluorine, chlorine, bromine or iodine atom, a C_{1-3}-alkyl, trifluoromethyl, hydroxy or C_{1-3}-alkyloxy group or a cyano group, or

R^{11} together with R^{12}, if they are bound to adjacent carbon atoms, also denote a methylenedioxy, difluoromethylenedioxy, straight-chain C_{3-5}-alkylene or –CH=CH-CH=CH- group, while the –CH=CH-CH=CH- group may be substituted by a fluorine, chlorine or bromine atom, by a methyl, trifluoromethyl, cyano, aminocarbonyl, aminosulphonyl, methylsulphonyl, methylsulphonylamino, methoxy, difluoromethoxy or trifluoromethoxy group, and

R^{13} and R^{14}, which may be identical or different, in each case represent a fluorine, chlorine or bromine atom, a trifluoromethyl, C_{1-3}-alkyl or C_{1-3}-alkyloxy group,

a phenyl group which may be substituted by the groups R^{10} to R^{14}, where R^{10} to R^{14} are as hereinbefore defined in this claim,

a phenyl-C_{2-3}-alkenyl group wherein the phenyl moiety may be substituted by the groups R^{10} to R^{14}, where R^{10} to R^{14} are as hereinbefore defined in this claim, and

the alkenyl group may be substituted by one to four fluorine atoms or methyl groups, while the substituents may be identical or different,

a phenyl-C_{2-3}-alkynyl group wherein the phenyl moiety may be substituted by the groups R^{10} to R^{14}, where R^{10} to R^{14} are as hereinbefore defined in this claim,

a heteroaryl-C_{1-6}-alkyl group, while the C_{1-6}-alkyl group may be substituted by one to twelve fluorine atoms,

a heteroaryl group,

a heteroaryl-C_{2-3}-alkenyl group, while the alkenyl group may be substituted by one to four fluorine atoms or methyl groups, while the substituents may be identical or different, or

a heteroaryl-C_{2-3}-alkynyl group and

B denotes an E-G group wherein E is linked to the group A and

E denotes an oxygen or sulphur atom,

an -NR_a- group wherein R_a denotes a hydrogen atom, a C_{1-6}-alkyl, C_{3-6}-alkenyl, C_{3-6}-alkynyl, C_{3-7}-cycloalkyl, phenyl, phenylmethyl, heteroaryl, heteroarylmethyl, amino, C_{1-6}-alkylamino, di-(C_{1-6}-alkyl)amino, hydroxy, C_{1-6}-alkyloxy group, while the above-mentioned phenyl rings may each be substituted by the groups R^{10} to R^{11}, while R^{10} to R^{11} are as hereinbefore defined in this claim,

an -NR_a-NR_a- group wherein R_a is as hereinbefore defined in this claim and the two groups R_a may be identical or different,

an -NH-NH- group wherein the two hydrogen atoms are replaced by a straight-chain C_{3-5}-alkylene bridge,

an $-O-NR_a-$ group wherein R_a is as hereinbefore defined in this claim and the oxygen atom is linked to the group A and the nitrogen atom is linked to the group G,

a $-O-CR_bR_c-$ group wherein the oxygen atom is linked to the group A and the carbon atom is linked to the group G and wherein R_b and R_c, which may be identical or different, denote a hydrogen or fluorine atom, a C_{1-6}-alkyl, C_{3-7}-cycloalkyl, phenyl, phenylmethyl, while the phenyl rings may each be substituted by the groups R^{10} to R^{14}, while R^{10} to R^{14} are as hereinbefore defined in this claim, or a heteroaryl or heteroarylmethyl group or R_b and R_c together denote a straight-chain C_{2-6}-alkylene group,

a $-S-CR_bR_c-$ group wherein the sulphur atom is linked to the group A and the carbon atom is linked to the group G and R_b and R_c, which may be identical or different, are as hereinbefore defined in this claim,

a $-SO-CR_bR_c-$ group wherein the sulphur atom is linked to the group A and the carbon atom is linked to the group G and R_b and R_c, which may be identical or different, are as hereinbefore defined in this claim,

a $-SO_2-CR_bR_c-$ group wherein the sulphur atom is linked to the group A and the carbon atom is linked to the group G and R_b and R_c, which may be identical or different, are as hereinbefore defined in this claim,

or a $-NR_a-CR_bR_c-$ group wherein the nitrogen atom is linked to the group A and the carbon atom is linked to the group G and R_a, R_b and R_c, which may be identical or different, are as hereinbefore defined in this claim,

and G denotes a carbonyl or thiocarbonyl group,

a methylene group substituted by an imino group wherein the nitrogen atom may be substituted by a C_{1-6}-alkyl, C_{3-6}-alkenyl, C_{3-6}-alkynyl, C_{3-7}-cycloalkyl, phenyl, phenylmethyl, heteroaryl, heteroarylmethyl, amino, C_{1-6}-alkylamino, di-(C_{1-6}-alkyl)amino, pyrrolidin-1-yl, piperidin-1-yl, morpholin-4-yl, C_{1-6}-alkyl-carbonylamino, phenylcarbonylamino, C_{1-6}-alkyloxy-carbonylamino, C_{1-6}-alkylsulphonylamino, phenylsulphonylamino, hydroxyl, C_{1-6}-alkyloxy, cyano or nitro group, while the above-mentioned phenyl groups may be substituted by the groups R^{10} to R^{14}, where R^{10} to R^{14} are as hereinbefore defined in this claim,

a 1,1-ethenylene group wherein the carbon atom in the exo position may be substituted by one or two chlorine or fluorine atoms or one or two C_{1-6}-alkyl, C_{1-6}-perfluoroalkyl, C_{3-6}-alkenyl, C_{3-6}-alkynyl, C_{3-7}-cycloalkyl, phenyl, phenylmethyl, heteroaryl, heteroarylmethyl, C_{1-6}-alkyl-carbonyl, C_{3-7}-cycloalkyl-carbonyl, phenylcarbonyl, heteroarylcarbonyl, carboxy, C_{1-6}-alkyloxy-carbonyl, aminocarbonyl, C_{1-6}-alkylaminocarbonyl, di-(C_{1-6}-alkyl)aminocarbonyl, pyrrolidin-1-ylcarbonyl, piperidin-1-ylcarbonyl, morpholin-4-ylcarbonyl, phenylaminocarbonyl, heteroarylaminocarbonyl, C_{1-6}-alkylsulphinyl, C_{3-7}-cycloalkylsulphinyl, phenylsulphinyl, heteroarylsulphinyl, C_{1-6}-alkylsulphonyl, C_{3-7}-cycloalkylsulphonyl, phenylsulphonyl, heteroarylsulphonyl, cyano or nitro groups, while the substituents may be identical or different and the above-mentioned phenyl groups may be substituted by the groups R^{10} to R^{14}, while R^{10} to R^{14} are as hereinbefore defined in this claim,

or represent a sulphinyl or sulphonyl group,

or A together with B denotes a 1,2,3,4-tetrahydroquinolinylcarbonyl, 1,2,3,4-tetrahydroisoquinolinylcarbonyl, 2,3-dihydroindolylcarbonyl or 2,3-

dihydroisoindolylcarbonyl group wherein the benzo groups may in each case be substituted by the groups R^{10} to R^{13}, while R^{10} to R^{13} are as hereinbefore defined in this claim and one or two carbon atoms of the benzo group may be replaced by nitrogen atoms and the alkylene moieties of the above-mentioned groups may in each case be substituted by one or two fluorine atoms, one or two methyl groups or an oxo group, while the substituents may be identical or different,

and D denotes a C_{1-6}-alkylene group which may be substituted by one to twelve fluorine atoms,

a C_{2-3}-alkenylene group which may be substituted by one to four fluorine atoms or methyl groups,

or a propynylene group,

R^2 denotes a hydrogen atom,

a C_{1-6}-alkyl group,

a C_{2-4}-alkenyl group,

a C_{3-4}-alkynyl group,

a C_{3-6}-cycloalkyl group,

a C_{3-6}-cycloalkyl-C_{1-3}-alkyl group,

a tetrahydrofuran-3-yl, tetrahydropyran-3-yl, tetrahydropyran-4-yl, tetrahydrofuranylmethyl or tetrahydropyranylmethyl group,

an aryl group,

an aryl-C_{1-4}-alkyl group,

an aryl-C_{2-3}-alkenyl group,

an arylcarbonyl-C_{1-2}-alkyl group,

a heteroaryl-C_{1-3}-alkyl group,

a furanylcarbonylmethyl, thienylcarbonylmethyl, thiazolylcarbonylmethyl or pyridylcarbonylmethyl group,

a C_{1-4}-alkyl-carbonyl-C_{1-2}-alkyl group,

a C_{3-6}-cycloalkyl-carbonyl-C_{1-2}-alkyl group,

an aryl-G-C_{1-3}-alkyl group, while G denotes an oxygen or sulphur atom, an imino, C_{1-3}-alkylimino, sulphinyl or sulphonyl group,

a C_{1-4}-alkyl group substituted by a group R_d, wherein

R_d denotes a cyano, carboxy, C_{1-3}-alkyloxy-carbonyl, aminocarbonyl, C_{1-3}-alkylamino-carbonyl, di-(C_{1-3}-alkyl)-amino-carbonyl, pyrrolidin-1-ylcarbonyl, piperidin-1-ylcarbonyl, morpholin-4-ylcarbonyl, piperazin-1-ylcarbonyl, 4-methylpiperazin-1-ylcarbonyl or 4-ethylpiperazin-1-ylcarbonyl group,

or a C_{2-4}-alkyl group substituted by a group R_e, where

R_e denotes a hydroxy, C_{1-3}-alkyloxy, amino, C_{1-3}-alkylamino, di-(C_{1-3}-alkyl)-amino, pyrrolidin-1-yl, piperidin-1-yl, morpholin-4-yl, piperazin-1-yl, 4-methyl-piperazin-1-yl or 4-ethyl-piperazin-1-yl group and is isolated from the

cyclic nitrogen atom in the 3 position of the xanthine structure by at least two carbon atoms,

R^3 denotes a C_{3-8}-alkyl group,

a C_{1-3}-alkyl group substituted by a group R_f, where

R_f denotes a C_{3-7}-cycloalkyl group optionally substituted by one or two C_{1-3}-alkyl groups or

a C_{5-7}-cycloalkenyl group optionally substituted by one or two C_{1-3}-alkyl groups,

a C_{3-8}-alkenyl group,

a C_{3-6}-alkenyl group substituted by a fluorine, chlorine or bromine atom or a trifluoromethyl group,

a C_{3-8}-alkynyl group,

an aryl group or

an aryl-C_{2-4}-alkenyl group,

and

R^4 denotes an azetidin-1-yl or pyrrolidin-1-yl group which is substituted in the 3 position by an amino, C_{1-3}-alkylamino or a di-(C_{1-3}-alkyl)amino group and may additionally be substituted by one or two C_{1-3}-alkyl groups,

a piperidin-1-yl or hexahydroazepin-1-yl group which is substituted in the 3 position or in the 4 position by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)amino group and may additionally be substituted by one or two C_{1-3}-alkyl groups,

a 3-amino-piperidin-1-yl group wherein the piperidin-1-yl-moiety is additionally substituted by an aminocarbonyl, C_{1-2}-alkyl-aminocarbonyl, di-(C_{1-2}-alkyl)aminocarbonyl, pyrrolidin-1-yl-carbonyl, (2-cyano-pyrrolidin-1-yl)carbonyl, thiazolidin-3-yl-carbonyl, (4-cyano-thiazolidin-3-yl)carbonyl, piperidin-1-ylcarbonyl or morpholin-4-ylcarbonyl group,

a 3-amino-piperidin-1-yl group wherein the piperidin-1-yl-moiety in the 4 position or in the 5 position is additionally substituted by a hydroxy or methoxy group,

a 3-amino-piperidin-1-yl group wherein the methylene group in the 2 position or in the 6 position is replaced by a carbonyl group,

a piperidin-1-yl or hexahydroazepin-1-yl group substituted in the 3 position by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group, wherein in each case two hydrogen atoms on the carbon skeleton of the piperidin-1-yl or hexahydroazepin-1-yl- group are replaced by a straight-chain alkylene bridge, this bridge containing 2 to 5 carbon atoms if the two hydrogen atoms are located on the same carbon atom, or 1 to 4 carbon atoms if the hydrogen atoms are located on adjacent carbon atoms, or 1 to 4 carbon atoms if the hydrogen atoms are located on carbon atoms separated by one atom, or 1 to 3 carbon atoms if the two hydrogen atoms are located on carbon atoms separated by two atoms,

an azetidin-1-yl, pyrrolidin-1-yl, piperidin-1-yl or hexahydroazepin-1-yl group which is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)-amino-C_{1-3}-alkyl group,

a piperazin-1-yl or [1,4]diazepan-1-yl group optionally substituted on the carbon skeleton by one or two C_{1-3}-alkyl groups, while in those compounds wherein

the group E denotes an oxygen atom and the group G denotes a carbonyl group,

the group E denotes an oxygen atom and the group G denotes a sulphonyl group,

the group E denotes an -NR_a- group and the group G denotes a carbonyl group wherein R_a is as hereinbefore defined in this claim,

the group E denotes an -NR_a- group wherein R_a is as hereinbefore defined in this claim,

and the group G denotes a sulphonyl group or the group A denotes a phenyl or heteroaryl group optionally substituted by one of the above-mentioned groups and the group E denotes an oxygen atom and the group G denotes an ethenylene group,

R^4 cannot represent a piperazin-1-yl or [1,4]diazepan-1-yl group optionally substituted on the carbon skeleton by one or two C_{1-3}-alkyl groups,

a 3-imino-piperazin-1-yl, 3-imino-[1,4]diazepan-1-yl or 5-imino-[1,4]diazepan-1-yl group optionally substituted on the carbon skeleton by one or two C_{1-3}-alkyl groups,

a [1,4]diazepan-1-yl group optionally substituted by one or two C_{1-3}-alkyl groups which is substituted in the 6 position by an amino group,

a C_{3-7}-cycloalkyl group which is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group,

a C_{3-7}-cycloalkyl group which is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

a C_{3-7}-cycloalkyl-C_{1-2}-alkyl group wherein the cycloalkyl moiety is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group,

a C_{3-7}-cycloalkyl-C_{1-2}-alkyl group wherein the cycloalkyl moiety is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

a C_{3-7}-cycloalkylamino group wherein the cycloalkyl moiety is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group, while the two nitrogen atoms on the cycloalkyl moiety are separated from one another by at least two carbon atoms,

an N-(C_{3-7}-cycloalkyl)-N-(C_{1-3}-alkyl)-amino group wherein the cycloalkyl moiety is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group, while the two nitrogen atoms on the cycloalkyl moiety are separated from one another by at least two carbon atoms,

a C_{3-7}-cycloalkylamino group wherein the cycloalkyl moiety is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

an N-(C_{3-7}-cycloalkyl)-N-(C_{1-3}-alkyl)-amino group wherein the cycloalkyl moiety is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

a C_{3-7}-cycloalkyl-C_{1-2}-alkyl-amino group wherein the cycloalkyl moiety is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group,

an N-(C_{3-7}-cycloalkyl-C_{1-2}-alkyl)-N-(C_{1-2}-alkyl)-amino group wherein the cycloalkyl moiety is substituted by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group,

a C_{3-7}-cycloalkyl-C_{1-2}-alkyl-amino group wherein the cycloalkyl moiety is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

an N-(C_{3-7}-cycloalkyl-C_{1-2}-alkyl)-N-(C_{1-2}-alkyl)-amino group wherein the cycloalkyl moiety is substituted by an amino-C_{1-3}-alkyl, C_{1-3}-alkylamino-C_{1-3}-alkyl or a di-(C_{1-3}-alkyl)amino-C_{1-3}-alkyl group,

a R^{19}-C_{2-4}-alkylamino group wherein R^{19} is separated from the nitrogen atom of the C_{2-4}-alkylamino moiety by at least two carbon atoms and

R^{19} denotes an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)-amino group,

an R^{19}-C_{2-4}-alkylamino group wherein the nitrogen atom of the C_{2-4}-alkylamino moiety is substituted by a C_{1-3}-alkyl group and R^{19} is separated from the nitrogen atom of the C_{2-4}-alkylamino moiety by at least two carbon atoms, while R^{19} is as hereinbefore defined in this claim,

an amino group substituted by the group R^{20} wherein

R^{20} denotes an azetidin-3-yl, azetidin-2-ylmethyl, azetidin-3-ylmethyl, pyrrolidin-3-yl, pyrrolidin-2-ylmethyl, pyrrolidin-3-ylmethyl, piperidin-3-yl, piperidin-4-yl, piperidin-2-ylmethyl, piperidin-3-ylmethyl or piperidin-4-ylmethyl group, while the groups mentioned for R^{20} may in each case be substituted by one or two C_{1-3}-alkyl groups,

an amino group substituted by the group R^{20} and a C_{1-3}-alkyl group wherein R^{20} is as hereinbefore defined in this claim, while the groups mentioned for R^{20} may in each case be substituted by one or two C_{1-3}-alkyl groups,

an R^{19}-C_{3-4}-alkyl group wherein the C_{3-4}-alkyl moiety is straight-chain and may additionally be substituted by one or two C_{1-3}-alkyl groups, while R^{19} is as hereinbefore defined in this claim,

a 3-amino-2-oxo-piperidin-5-yl or 3-amino-2-oxo-1-methyl-piperidin-5-yl group,

a pyrrolidin-3-yl, piperidin-3-yl, piperidin-4-yl, hexahydroazepin-3-yl or hexahydroazepin-4-yl group which is substituted in the 1 position by an amino, C_{1-3}-alkylamino or di-(C_{1-3}-alkyl)amino group,

or an azetidin-2-yl-C_{1-2}-alkyl, azetidin-3-yl-C_{1-2}-alkyl, pyrrolidin-2-yl-C_{1-2}-alkyl, pyrrolidin-3-yl, pyrrolidin-3-yl-C_{1-2}-alkyl, piperidin-2-yl-C_{1-2}-alkyl, piperidin-3-yl, piperidin-3-yl-C_{1-2}-alkyl, piperidin-4-yl or piperidin-4-yl-C_{1-2}-alkyl group, while the above-mentioned groups may in each case be substituted by one or two C_{1-3}-alkyl groups,

while by the aryl groups mentioned in the definition of the above groups are meant phenyl or naphthyl groups, which may be mono- or disubstituted by R_h independently of one another, where the substituents are identical or different and R_h denotes a fluorine, chlorine, bromine or iodine atom, a trifluoromethyl, cyano, nitro, amino, aminocarbonyl, aminosulphonyl, methylsulphonyl, acetylamino, methylsulphonylamino, C_{1-4}-alkyl, C_{1-3}-alkyl-carbonyl, cyclopropyl, ethenyl, ethynyl, hydroxy, C_{1-4}-alkyloxy, C_{1-4}-alkoxy-carbonyl, methylsulphinyl, phenylsulphinyl, methylsulphonyl, phenylsulphonyl, difluoromethoxy or trifluoromethoxy group,

by the heteroaryl groups mentioned in the definitions of the above-mentioned groups are meant a pyrrolyl, furanyl, thienyl, pyridyl, indolyl, benzofuranyl, benzothiophenyl, quinolinyl or isoquinolinyl group,

or a pyrrolyl, furanyl, thienyl or pyridyl group wherein one or two methyne groups are replaced by nitrogen atoms,

or an indolyl, benzofuranyl, benzothiophenyl, quinolinyl or isoquinolinyl group wherein one to three methyne groups are replaced by nitrogen atoms,

or a 1,2-dihydro-2-oxo-pyridinyl, 1,4-dihydro-4-oxo-pyridinyl, 2,3-dihydro-3-oxo-pyridazinyl, 1,2,3,6-tetrahydro-3,6-dioxo-pyridazinyl, 1,2-dihydro-2-oxo-pyrimidinyl, 3,4-dihydro-4-oxo-pyrimidinyl, 1,2,3,4-tetrahydro-2,4-dioxo-pyrimidinyl, 1,2-dihydro-2-oxo-pyrazinyl, 1,2,3,4-tetrahydro-2,3-dioxo-pyrazinyl, 2,3-dihydro-2-oxo-indolyl, 2,3-dihydrobenzofuranyl, 2,3-dihydro-2-oxo-1*H*-benzimidazolyl, 2,3-dihydro-2-oxo-benzoxazolyl, 1,2-dihydro-2-oxo-quinolinyl, 1,4-dihydro-4-oxo-quinolinyl, 1,2-dihydro-1-oxo-isoquinolinyl, 1,4-dihydro-4-oxo-cinnolinyl, 1,2-dihydro-2-oxo-quinazolinyl, 3,4-dihydro-4-oxo-quinazolinyl, 1,2,3,4-tetrahydro-2,4-dioxo-quinazolinyl, 1,2-dihydro-2-oxoquinoxalinyl, 1,2,3,4-tetrahydro-2,3-dioxo-quinoxalinyl, 1,2-dihydro-1-oxo-phthalazinyl, 1,2,3,4-tetrahydro-1,4-dioxo-phthalazinyl, chromanyl, cumarinyl, 2,3-dihydro-benzo[1,4]dioxinyl or 3,4-dihydro-3-oxo-2*H*-benzo[1,4]oxazinyl group,

and the above-mentioned heteroaryl groups may be mono- or disubstituted by R_h, while the substituents may be identical or different and R_h is as hereinbefore defined in this claim,

and, unless otherwise stated, the above-mentioned alkyl, alkenyl and alkynyl groups may be straight-chain or branched,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof, the prodrugs thereof and the salts thereof.

2. The compound of general formula I according to claim 1, wherein

R^1, R^2 and R^3 are defined as in claim 1 and

R^4 denotes a pyrrolidin-1-yl group which is substituted in the 3 position by an amino group,

a piperidin-1-yl group which is substituted in the 3 position by an amino group,

a hexahydroazepin-1-yl- group which is substituted in the 3 position or in the 4 position by an amino group,

a (2-aminocyclohexyl)amino group,

a cyclohexyl group which is substituted in the 3 position by an amino group, or

an *N*-(2-aminoethyl)-*N*-methylamino or an *N*-(2-aminoethyl)-*N*-ethylamino group,

while, unless otherwise mentioned, the above-mentioned alkyl, alkenyl and alkynyl groups may be straight-chain or branched,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

3. The compound of general formula I according to claim 2, wherein

R^1 denotes an A-B-D group wherein

A denotes a phenyl, phenylmethyl, 1-phenylethyl, pyridinyl, pyridinylmethyl, 1-pyridinylethyl, pyrimidinyl, pyrimidinylmethyl, pyrazinyl, pyrazinylmethyl, 1,3,5-triazinyl, 1,3,5-triazinylmethyl, 1,2,4-triazinyl, 1,2,4-triazinylmethyl, furanyl, thienyl, pyrrolyl, imidazolyl, 1,3-oxazolyl group, while the above-mentioned phenyl and heteroaryl groups may be substituted by a fluorine, chlorine or bromine atom or by a C_{1-4}-alkyl, C_{1-4}-alkoxy, trifluoromethyl,

cyano, C_{1-3}-alkyl-carbonyl, C_{1-4}-alkoxy-carbonyl, methylsulphinyl, phenylsulphinyl, methylsulphonyl, phenylsulphonyl, amino or nitro group and may optionally additionally be substituted by a fluorine, chlorine or bromine atom or by a C_{1-4}-alkyl, C_{1-4}-alkoxy, trifluoromethyl or cyano group, while the substituents may be identical or different, and

B denotes an E-G group wherein E is linked to the group A and

E denotes an oxygen atom, an –NH-, -$N(CH_3)$- or -NH-NH- group or a -OCH_2- group wherein the oxygen atom is linked to the group A and the carbon atom is linked to the group G, and

G denotes a carbonyl group,

a cyanoiminomethylene or nitroiminomethylene group

or a 1,1-ethenylene group wherein the carbon atom in the exo position may be substituted by one or two trifluoromethyl, cyano, nitro, C_{1-3}-alkyloxy-carbonyl, C_{1-4}-alkyl-carbonyl, phenylcarbonyl, C_{1-3}-alkylsulphinyl, phenylsulphinyl, C_{1-3}-alkylsulphonyl or phenylsulphonyl groups, while the substituents may be identical or different and the above-mentioned phenyl groups may be substituted by one or two fluorine, chlorine or bromine atoms or one or two C_{1-3}-alkyl, trifluoromethyl, C_{1-3}-alkoxy, cyano, C_{1-3}-alkyl-carbonyl, C_{1-3}-alkoxy-carbonyl, methylsulphinyl, phenylsulphinyl, methylsulphonyl, phenylsulphonyl or nitro groups, while these substituents may also be identical or different,

or A and B together denote a 1,2,3,4-tetrahydroquinolin-1-ylcarbonyl or 1,2,3,4-tetrahydroisoquinolin-2-ylcarbonyl group and

D denotes a methylene group,

R^2 denotes a hydrogen atom,

or a C_{1-3}-alkyl group,

R^3 denotes a C_{4-6}-alkenyl group,

a 2-butyn-1-yl group or

a 1-cyclopenten-1-yl-methyl group

and

R^4 denotes a piperidin-1-yl group which is substituted in the 3 position by an amino group,

a hexahydroazepin-1-yl- group which is substituted in the 3 position or in the 4 position by an amino group,

a (2-aminocyclohexyl)amino group,

a cyclohexyl group which is substituted in the 3 position by an amino group, or

an *N*-(2-aminoethyl)-*N*-methylamino or an *N*-(2-aminoethyl)-*N*-ethylamino group,

while, unless otherwise mentioned, the above-mentioned alkyl, alkenyl and alkynyl groups may be straight-chain or branched,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

4. The compound of general formula I according to claim 3, wherein

R^1 denotes an A-B-D group wherein

A denotes a phenyl, phenylmethyl, 1-phenylethyl, pyridinyl, pyridinylmethyl, 1-pyridinylethyl, pyrimidinyl or pyrimidinylmethyl group, where the phenyl moiety may be substituted by a fluorine, chlorine or bromine atom or by a C_{1-4}-alkyl, trifluoromethyl, C_{1-4}-alkoxy, cyano, C_{1-3}-alkyl-carbonyl, C_{1-4}-alkoxy-carbonyl, methylsulphinyl, phenylsulphinyl, methylsulphonyl, phenylsulphonyl, amino or nitro group and may optionally additionally be substituted by a fluorine, chlorine or bromine atom or by a C_{1-4}-alkyl, trifluoromethyl, C_{1-4}-alkoxy or cyano group, while the substituents may be identical or different, and

B denotes a E-G group wherein E is linked to the group A and

E denotes an oxygen atom, an –NH- group, $-N(CH_3)-$ group or $-OCH_2-$ group wherein the oxygen atom is linked to the group A and the carbon atom is linked to the group G, and

G denotes a carbonyl group,

or A and B together denote a 1,2,3,4-tetrahydroquinolin-1-ylcarbonyl or 1,2,3,4-tetrahydroisoquinolin-2-ylcarbonyl group and

D denotes a methylene group,

R^2 denotes a methyl group,

R^3 denotes a 2-buten-1-yl or 3-methyl-2-buten-1-yl group or

a 2-butyn-1-yl group

and

R^4 denotes a (3-amino-piperidin-1-yl) group,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

5. The compound of general formula I according to claim 4, wherein

R^1 denotes an A-B-D group wherein

A denotes a phenyl, phenylmethyl, pyridinyl or pyridinylmethyl group wherein the phenyl rings may be substituted by an amino, methoxy, methyl, cyano or nitro group, and

B denotes an E-G group wherein E is linked to the group A and

E denotes an oxygen atom, an –NH- group or -OCH_2- group wherein the oxygen atom is linked to the group A and the carbon atom is linked to the group G, and

G denotes a carbonyl group,

or A and B together denote a 1,2,3,4-tetrahydroquinolin-1-ylcarbonyl or 1,2,3,4-tetrahydroisoquinolin-2-ylcarbonyl group and

D denotes a methylene group,

R^2 denotes a methyl group,

R^3 denotes a 2-buten-1-yl or 3-methyl-2-buten-1-yl group or

a 2-butyn-1-yl group

and

R^4 denotes a (3-amino-piperidin-1-yl) group,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

6. The following compounds of general formula I according to claim 1:

(a) 1-[(benzyloxycarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(b) 1-[(benzylaminocarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(c) 1-[(phenylaminocarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(d) 1-{[(pyridin-2-yl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(e) 1-{[(pyridin-3-yl)methoxycarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(f) 1-{[(pyridin-3-yl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(g) 1-{[(2-methyl-phenyl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(h) 1-{[(2-nitro-phenyl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(i) 1-{[(4-cyano-phenyl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-(3-amino-piperidin-1-yl)-xanthine,

(j) 1-{[(2-methoxy-phenyl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(k) 1-(2-oxo-3-phenoxy-propyl)-3-methyl-7-(2-butyn-1-yl)-8-(3-amino-piperidin-1-yl)-xanthine,

(l) 1-[(2-amino-benzylaminocarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-(3-amino-piperidin-1-yl)-xanthine,

(m) 1-[2-(3,4-dihydro-1*H*-isoquinolin-2-yl)-2-oxo-ethyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(n) 1-[2-(3,4-dihydro-2*H*-quinolin-1-yl)-2-oxo-ethyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine,

(o) 1-{[(3-cyano-phenyl)aminocarbonyl]methyl}-3-methyl-7-(2-butyn-1-yl)-8-(3-amino-piperidin-1-yl)-xanthine,

(p) 1-[(3-methoxy-benzyloxycarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine and

(q) 1-[(3-nitro-benzyloxycarbonyl)methyl]-3-methyl-7-(2-butyn-1-yl)-8-[(*R*)-3-amino-piperidin-1-yl]-xanthine

and the salts thereof.

7. A physiologically acceptable salt of the compound according to any one of claims 1 to 6 with inorganic or organic acids or bases.

8. A pharmaceutical composition containing the compound according to any one of claims 1 to 6 optionally together with one or more inert carriers and/or diluents.

9. A pharmaceutical composition containing the physiologically acceptable salt according to claim 7 optionally together with one or more inert carriers and/or diluents.

10. A method for treating a disease or syndrome in a patient comprising administering to the patient a pharmaceutical composition comprising, the compound or physiologically acceptable salt according to any one of claims 1 to 6 wherein the disease or syndrome is selected from the group consisting of: type I and type II diabetes mellitus, arthritis, obesity, allograft transplantation and osteoporosis caused by calcitonin.

11. A method for treating a disease or syndrome in a patient comprising administering to the patient a pharmaceutical composition comprising, the physiologically acceptable salt according to claim 7 wherein the disease or syndrome is selected from the group consisting of: type I and type II diabetes mellitus, arthritis, obesity, allograft transplantation and osteoporosis caused by calcitonin.

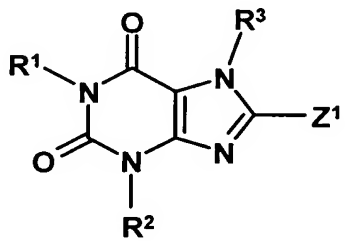
12. A process for preparing a pharmaceutical composition wherein the compound according to any one of claims 1 to 6 is incorporated in one or more inert carriers and/or diluents by a non-chemical method.

13. A process for preparing a pharmaceutical composition wherein the physiologically acceptable salt according to claim 7 is incorporated in one or more inert carriers and/or diluents by a non-chemical method.

14. A process for preparing the compound of general formula I according to one of claims 1 to 6, wherein:

a) in order to prepare compounds of general formula I wherein R^4 is one of the groups mentioned in claim 1, linked to the xanthine structure via a nitrogen atom,

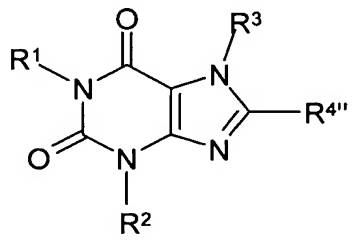
a compound of general formula



(II),

wherein
R^1 to R^3 are defined as in claim 1 and
Z^1 denotes a leaving group such as a halogen atom, a substituted hydroxy, mercapto, sulphinyl, sulphonyl or sulphonyloxy group,
is reacted with an amine of general formula $R^{4'}$-H, wherein $R^{4'}$ denotes one of the groups mentioned for R^4 in claim 1 which is linked to the xanthine structure via a nitrogen atom, or

b) a compound of general formula



(III),

wherein R^1, R^2 and R^3 are defined as in claim 1 and
$R^{4''}$ denotes one of the groups mentioned for R^4 hereinbefore which contain an imino, amino or alkylamino group, while the imino, amino or alkylamino group is substituted by a protective group, is deprotected and then is optionally alkylated at the imino, amino or C_{1-3}-alkylamino group, and/or

then any protective groups used during the reaction are cleaved and/or

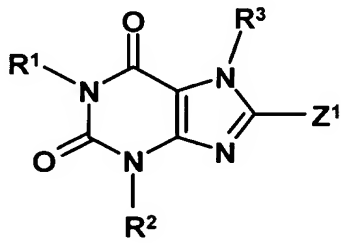
the compounds of general formula I thus obtained are resolved into their enantiomers and/or diastereomers and/or

the compounds of formula I obtained are converted into their salts, particularly for pharmaceutical use into the physiologically acceptable salts thereof with inorganic or organic acids or bases.

15. A process for preparing the physiologically acceptable salt according to claim 7, wherein:

a) in order to prepare compounds of general formula I wherein R^4 is one of the groups mentioned in claim 1, linked to the xanthine structure via a nitrogen atom,

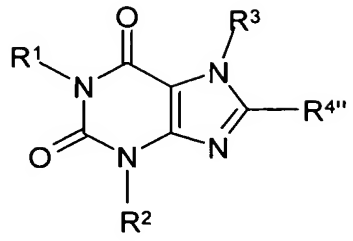
a compound of general formula



(II),

wherein
R^1 to R^3 are defined as in claim 1 and
Z^1 denotes a leaving group such as a halogen atom, a substituted hydroxy, mercapto, sulphinyl, sulphonyl or sulphonyloxy group,
is reacted with an amine of general formula $R^{4'}$-H, wherein $R^{4'}$ denotes one of the groups mentioned for R^4 in claim 1 which is linked to the xanthine structure via a nitrogen atom, or

b) a compound of general formula



(III),

wherein R^1, R^2 and R^3 are defined as in claim 1 and

$R^{4''}$ denotes one of the groups mentioned for R^4 hereinbefore which contain an imino, amino or alkylamino group, while the imino, amino or alkylamino group is substituted by a protective group, is deprotected and then is optionally alkylated at the imino, amino or C_{1-3}-alkylamino group, and/or

then any protective groups used during the reaction are cleaved and/or

the compounds of general formula I thus obtained are resolved into their enantiomers and/or diastereomers and/or

the compounds of formula I obtained are converted into their salts, particularly for pharmaceutical use into the physiologically acceptable salts thereof with inorganic or organic acids or bases.